

Activity # 12



Title: Separation Techniques (Homework assignment)-Teacher's Copy

Note to the teacher: This exercise is intended to be assigned as a homework assignment after having covered the curriculum dealing with properties of matter (density, boiling point, solubility, etc.). It allows the student to achieve success through a variety of explanations that could feasibly perform the task. The student is not expected to actually perform the separation task at home, although it could easily be performed in the classroom upon the collection of the assignment.

National Science Education Standards addressed:

Science as Inquiry

CONTENT STANDARD A:

As a result of activities in grades 5-8, all students should develop

- Abilities necessary to do scientific inquiry
- Understandings about scientific inquiry

COMMUNICATE SCIENTIFIC PROCEDURES AND EXPLANATIONS. With practice, students should become competent at communicating experimental methods, following instructions, describing observations, summarizing the results of other groups, and telling other students about investigations and explanations.

- Scientific explanations emphasize evidence, have logically consistent arguments, and use scientific principles, models, and theories. The scientific community accepts and uses such explanations until displaced by better scientific ones. When such displacement occurs, science advances.

Physical Science

CONTENT STANDARD B:

As a result of their activities in grades 5-8, all students should develop an understanding of

- Properties and changes of properties in matter

GUIDE TO THE CONTENT STANDARD

Fundamental concepts and principles that underlie this standard include

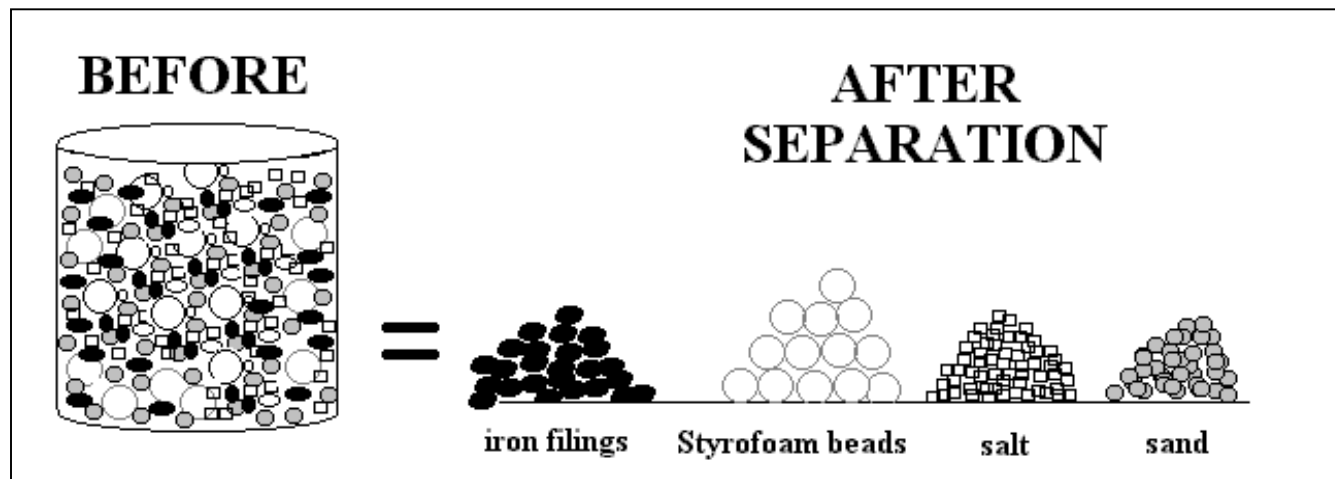
PROPERTIES AND CHANGES OF PROPERTIES IN MATTER

A substance has characteristic properties, such as density, a boiling point, and solubility, all of which are independent of the amount of the sample. A mixture of substances often can be separated into the original substances using one or more of the characteristic properties.

Separation Techniques

Prompt: You are given a DRY mixture of sand, iron filings (small, flakes of iron the size of coarse pepper particles), table salt and Styrofoam™ beads.

Directions for writing: Using standard supplies and equipment found in the science laboratory, describe the procedure one would follow to produce four individual **DRY** piles, each containing ONE of the mixture's components. Please note that the iron filings, the grains of sand and the salt crystals are roughly the same size.



Scoring Rubric:

Level 4	A magnet would be used to first separate the iron particles from the entire dry mixture. Water would now be added to the remaining mixture in a beaker. This would dissolve the salt, allow the sand to settle to the bottom while the Styrofoam™ beads would float to the top where they could be skimmed off and air-dried. The remaining salt-water solution with sand would be filtered, causing the salt water to pass through into a lower container and leaving the sand in the filter where it could then be dried. The water in the salt-water solution could then be boiled off, leaving the dry salt behind.
Level 3	Student supplies a response that would successfully separate three of the four components of the original mixture.
Level 2	Student supplies a response that would successfully separate two of the four components of the original mixture.
Level 1	Student supplies a response that would successfully separate one of the four components of the original mixture.
Level 0	Student supplies a response that would not successfully separate any of the four components of the original mixture, such as “Divide the original mixture into 4 equal piles using a knife.”
Blank	No response

Note: If the student fails to describe a technique for drying any component, it is not considered to be a “successful separation.”